AMENDMENTS TO THE DRAWINGS

Thirteen (13) Replacement Sheets of drawings are attached hereto as Appendix A, following page 22 of this paper. The Replacement Sheets include amended FIGs. 1 - 13, which replace originally submitted FIGs. 1 – 13. Originally submitted FIGs. 1 – 13 have been amended in response to the drawings objection stated in paragraph 1 of the Office Action. More specifically, the margins and font size of FIGs. 1 – 13 have been changed so that the drawings are in compliance with 37 CFR 1.121(d) and 37 CFR 1.84. The Applicants submit that no new matter has been introduced by the amendments to FIGs. 1 – 13.

REMARKS / ARGUMENTS

The present application includes pending claims 1-33, all of which have been rejected. The Applicants have amended claims 1 and 29 to further prosecution of the claims. The Applicants respectfully submit that the claims define patentable subject matter. The Applicants request reconsideration of the claims in view of the amendments and the following remarks.

Claims 29-33 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,275,543 issued to Petrus, et al. (hereinafter, Petrus). Claims 1-33 stand rejected under 35 U.S.C. § 102(b) as being anticipated by IDS document Rouphael (hereinafter, Rouphael). Claims 1-33 stand rejected under 35 U.S.C. § 102(b) as being anticipated by IDS document Klukas (hereinafter, Klukas). Claims 1-33 stand rejected under 35 U.S.C. § 102(b) as being anticipated by IDS document Kivinen (hereinafter, Kivinen). The Applicants respectfully traverse these rejections at least for the reasons set forth below.

Claim Rejections under 35 U.S.C. § 102

(Paragraphs 3 – 6 of the Office Action)

With regard to the anticipation rejections under 102(b), MPEP 2131 states that "[a] claim is anticipated only if **each and every element** as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *See* Manual of Patent Examining Procedure (MPEP) at 2131 (internal citation omitted). Furthermore, "[t]he identical invention must be shown in as complete detail as is contained in the ... claim." *See id.* (internal citation omitted).

Claims 29-33 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Petrus. Petrus discloses "a method for generating a reference signal from a modulated signal transmitted to a communications station that includes an array of antenna elements and spatial processing means." Petrus at Abstract. More

specifically, Petrus discloses a timing recovery and interpolation unit 217, which "time aligns and interpolates signal 215 to output a baud rate signal 219." *See id.* at column 8, lines 6 – 10. However, with regard to the rejection of independent claim 29 under Petrus, the Applicants submit that Petrus does not disclose or suggest at least the limitation of "an interpolation module coupled to the M signal processing chains, wherein the interpolation module is configured to generate N signal response values for the antenna array as a function of the M replicas of the received signal, wherein N is greater than M," as claimed by the Applicants in independent claim 29, as amended.

Based on at least the foregoing, the Applicants believe the rejection of independent claims 29 under 35 U.S.C. § 102(b) as being anticipated by Petrus has been overcome and request that the rejection be withdrawn. Additionally, claims 30-33 depend from independent claim 29 and are, consequently, also respectfully submitted to be allowable.

The Applicants now turn to the rejection of claims 1-33 under 35 U.S.C. § 102(b) as being anticipated by Rouphael. Rouphael discloses "a spatial interpolation algorithm for the upsampling...of uniform linear arrays (ULAs)...to enhance performance of a code division multiple access (CDMA) cellular antenna system." Rouphael at Abstract. More specifically, Rouphael teaches that "the ULA is interpolated to within the spatial Nyquist rate...by placing a virtual antenna element half way in between every two real adjacent antenna elements." *See id.* However, with regard to the rejection of independent claim 1 under Rouphael, the Applicants submit that Rouphael· does not disclose or suggest at least the limitation of "determining M responses of the M physical antenna elements to the signal, each of the M responses corresponding to one of the M physical antenna elements," as claimed by the Applicants in independent claim 1, as amended. Furthermore, Rouphael discloses "sampling the array below the Nyquist rate

allowing for spatial aliasing to occur," *See id.* Rouphael does not disclose or suggest at least the limitation of "generating, as a function of the responses of the M physical antenna elements to the signal, N responses to the signal, respectively associated with N spatial locations along the antenna array, wherein at least one of the N spatial locations is not coincident with a location of any of the M physical antenna elements and is placed at a non-equidistant location between two successive physical antenna elements," as claimed by the Applicants in independent claim 1, as amended.

With regard to the rejection of independent claim 10 under Rouphael, the Applicants submit that Rouphael does not disclose or suggest at least the limitation of "an array processing module including M signal processing chains, wherein each of the M signal processing chains is coupled to one of the M physical antenna elements, wherein the array processing module is configured to generate N signal response values for the antenna array as a function of the M replicas of the received signal; wherein the N signal response values include at least one virtual antenna response value, wherein N is greater than M," as claimed by the Applicants in independent claim 10.

With regard to the rejection of independent claim 20 under Rouphael, the Applicants submit that Rouphael does not disclose or suggest at least the limitation of "means for determining a response of each of the M physical antenna elements to the signal," as claimed by the Applicants in independent claim 20. In addition, Rouphael does not disclose or suggest at least the limitation of "means for generating, as a function of the responses of the M physical antenna elements to the signal, N responses to the signal, respectively associated with N spatial locations along the antenna array, wherein at least one of the N spatial locations is not coincident with a location of any of the M physical antenna elements," as claimed by the Applicants in independent claim 20.

With regard to the rejection of independent claim 29 under Rouphael, the Applicants submit that Rouphael does not disclose or suggest at least the limitation of "an interpolation module coupled to the M signal processing chains, wherein the interpolation module is configured to generate N signal response values for the antenna array as a function of the M replicas of the received signal, wherein N is greater than M," as claimed by the Applicants in independent claim 29, as amended.

With regard to the rejection of claims 9, 19, and 28, the Office Action states that "Rouphael further discloses the signal complies with a communication protocol selected from the group consisting of: OFDM, TDMA, CDMA, GMSK, CCK, QPSK, FSK, PSK, and QAM, Rouphael, p. 531, section I, 1st ¶." *See* the Office Action at page 4. However, Rouphael only discloses the use of a spatial interpolation algorithm "at the base station, to enhance the performance of a code division multiple access (CDMA) cellular antenna system."

Based on at least the foregoing, the Applicants believe the rejection of independent claims 1, 10, 20, and 29 under 35 U.S.C. § 102(b) as being anticipated by Rouphael has been overcome and request that the rejection be withdrawn. Additionally, claims 2-9, 11-19, 21-28, and 30-33 depend from independent claims 1, 10, 20, and 29, respectively, and are, consequently, also respectfully submitted to be allowable.

The Applicants now turn to the rejection of claims 1-33 under 35 U.S.C. § 102(b) as being anticipated by Klukas. Klukas discloses "angle of arrival (AOA) estimation utilizing the MUltiple Signal Identification and Classification (MUSIC) algorithm...for land vehicle location systems." Klukas at Abstract. More specifically, Klukas discloses the use of MUSIC "to estimate the AOA of individual arrivals as well as that of a cluster of arrivals." *See id.* However, with regard to the rejection of independent claim 1 under Klukas, the Applicants submit that

Klukas does not disclose or suggest at least the limitation of "determining M responses of the M physical antenna elements to the signal, each of the M responses corresponding to one of the M physical antenna elements," as claimed by the Applicants in independent claim 1, as amended. Furthermore, Klukas does not disclose or suggest at least the limitation of "generating, as a function of the responses of the M physical antenna elements to the signal, N responses to the signal, respectively associated with N spatial locations along the antenna array, wherein at least one of the N spatial locations is not coincident with a location of any of the M physical antenna elements and is placed at a non-equidistant location between two successive physical antenna elements," as claimed by the Applicants in independent claim 1, as amended.

With regard to the rejection of independent claim 10 under Klukas, the Applicants submit that Klukas does not disclose or suggest at least the limitation of "an array processing module including M signal processing chains, wherein each of the M signal processing chains is coupled to one of the M physical antenna elements, wherein the array processing module is configured to generate N signal response values for the antenna array as a function of the M replicas of the received signal; wherein the N signal response values include at least one virtual antenna response value, wherein N is greater than M," as claimed by the Applicants in independent claim 10.

With regard to the rejection of independent claim 20 under Klukas, the Applicants submit that Klukas does not disclose or suggest at least the limitation of "means for determining a response of each of the M physical antenna elements to the signal," as claimed by the Applicants in independent claim 20. In addition, Klukas does not disclose or suggest at least the limitation of "means for generating, as a function of the responses of the M physical antenna elements to the signal, N responses to the signal, respectively associated with N spatial

locations along the antenna array, wherein at least one of the N spatial locations is not coincident with a location of any of the M physical antenna elements," as claimed by the Applicants in independent claim 20.

With regard to the rejection of independent claim 29 under Klukas, the Applicants submit that Klukas does not disclose or suggest at least the limitation of "an interpolation module coupled to the M signal processing chains, wherein the interpolation module is configured to generate N signal response values for the antenna array as a function of the M replicas of the received signal, wherein N is greater than M," as claimed by the Applicants in independent claim 29, as amended.

Based on at least the foregoing, the Applicants believe the rejection of independent claims 1, 10, 20, and 29 under 35 U.S.C. § 102(b) as being anticipated by Klukas has been overcome and request that the rejection be withdrawn. Additionally, claims 2-9, 11-19, 21-28, and 30-33 depend from independent claims 1, 10, 20, and 29, respectively, and are, consequently, also respectfully submitted to be allowable.

The Applicants now turn to the rejection of claims 1-33 under 35 U.S.C. § 102(b) as being anticipated by Kivinen. Kivinen discloses "a calibration scheme...for synthesizer phase fluctuations in virtual antenna array measurements for wideband mobile radio channel sounding." Kivinen at Abstract. More specifically, Kivinen discloses calculation "of the standard deviation of the direction-of-arrival (DOA) error...from the Allan variance of frequency synthesizers." See id. However, with regard to the rejection of independent claim 1 under Kivinen, the Applicants submit that Kivinen does not disclose or suggest at least the limitation of "determining M responses of the M physical antenna elements to the signal, each of the M responses corresponding to one of the M physical antenna elements," as claimed by the Applicants in independent claim 1,

as amended. Furthermore, Kivinen does not disclose or suggest at least the limitation of "generating, as a function of the responses of the M physical antenna elements to the signal, N responses to the signal, respectively associated with N spatial locations along the antenna array, wherein at least one of the N spatial locations is not coincident with a location of any of the M physical antenna elements and is placed at a non-equidistant location between two successive physical antenna elements," as claimed by the Applicants in independent claim 1, as amended.

With regard to the rejection of independent claim 10 under Kivinen, the Applicants submit that Kivinen does not disclose or suggest at least the limitation of "an array processing module including M signal processing chains, wherein each of the M signal processing chains is coupled to one of the M physical antenna elements, wherein the array processing module is configured to generate N signal response values for the antenna array as a function of the M replicas of the received signal; wherein the N signal response values include at least one virtual antenna response value, wherein N is greater than M," as claimed by the Applicants in independent claim 10.

With regard to the rejection of independent claim 20 under Kivinen, the Applicants submit that Kivinen does not disclose or suggest at least the limitation of "means for determining a response of each of the M physical antenna elements to the signal," as claimed by the Applicants in independent claim 20. In addition, Kivinen does not disclose or suggest at least the limitation of "means for generating, as a function of the responses of the M physical antenna elements to the signal, N responses to the signal, respectively associated with N spatial locations along the antenna array, wherein at least one of the N spatial locations is not coincident with a location of any of the M physical antenna elements," as claimed by the Applicants in independent claim 20.

With regard to the rejection of independent claim 29 under Kivinen, the Applicants submit that Kivinen does not disclose or suggest at least the limitation of "an interpolation module coupled to the M signal processing chains, wherein the interpolation module is configured to generate N signal response values for the antenna array as a function of the M replicas of the received signal, wherein N is greater than M," as claimed by the Applicants in independent claim 29, as amended.

Based on at least the foregoing, the Applicants believe the rejection of independent claims 1, 10, 20, and 29 under 35 U.S.C. § 102(b) as being anticipated by Klukas has been overcome and request that the rejection be withdrawn. Additionally, claims 2-9, 11-19, 21-28, and 30-33 depend from independent claims 1, 10, 20, and 29, respectively, and are, consequently, also respectfully submitted to be allowable.

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CONCLUSION

Based on the foregoing, Applicant believes that all claims 1-33 are in condition for allowance. If the Examiner disagrees, Applicant respectfully requests a phone interview, and requests that the Examiner telephone the undersigned at 312-775-8176.
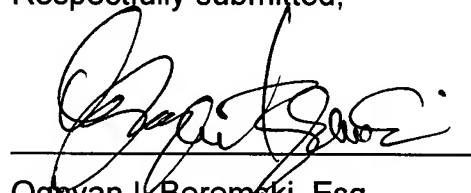
The Commissioner is hereby authorized to charge any additional fees or credit any overpayment to the deposit account of McAndrews, Held & Malloy, Ltd., Account No. 13-0017.

A Notice of Allowability is courteously solicited.

Respectfully submitted,

Date: January 5, 2006

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